REMARKS

This is intended as a full and complete response to the Final Office Action dated October 20, 2003, having a shortened statutory period for response set to expire on January 20, 2004. Please reconsider the claims pending in the application for reasons discussed below.

Claims 1-30, 38, 39, and 42-46 remain pending in the application and are shown above. Claims 1-9, 19-30, 38, 39, 42, 43, 45, and 46 are rejected and claims 10-18 and 44 are indicated to be allowable by the Examiner. Reconsideration of the rejected claims is requested for reasons presented below.

Claims 1-8, 19-29, 38, 39, 42, 43, 45, and 46 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over *Roberts, et al.* (U.S. Patent No. 6,461,914) in view of *Contolini, et al.* (U.S. Patent 5,486,234) or *Nishibe, et al* (U.S. Patent No. 6,299,697) on grounds that it would have been obvious to planarize a metal conductive layer using a combination of a wet etching process and a dry etching process because *Roberts, et al.* teaches using a process such as a wet etching process or a dry etching process to planarize a metal layer. Applicants respectfully traverse the rejection.

The Examiner states that "It is *prima facie* obvious to use two compositions (two methods) each of which is taught by the prior art to be useful for the same purpose" and cites *In re Kerkhoven* 205 USPQ 1069 (CCPA 1980), *In re Susi* 169 USPQ 423 (CCPA 1971), and *Ex parte Quadranti* USPQ 2d 1071 (BPAI 1992). Applicants note that *In re Kerkhoven* and MPEP 2144.06 state that "It is *prima facie* obvious to use two compositions each of which is taught by the prior art to be useful for the same purpose in order to form a third composition that is to be used for the very same purpose." However, the pending claims recite a process in which a first method for planarizing, *i.e.*, contacting a substrate with a liquid etching composition, is followed by a second method for planarizing, *i.e.*, exposed the substrate to an etchant gas, rather than a composition formed from two known compositions. *In re Kerkhoven*, *In re Susi*, and *Ex parte Quadranti* do not teach that is *prima facie* obvious to use two methods each of which is taught by the prior art to be useful for the same purpose. Applicants submit that the Examiner has misconstrued the law by holding that a process that includes a

sequence of two methods, each of which is described independently in a reference, is *prima facie* obvious. The cited decisions recited a different holding, and the Examiner has not explained how the different holding can be extended to the current facts.

Furthermore, Applicants submit that the Examiner has not shown how *Roberts, et al.* in view of *Contolini, et al* or *Nishibe, et al* suggests or motivates performing a wet etching process and then a dry etching process on a substrate. According to current practice, there must be a suggestion or motivation in the references or in the knowledge of one skilled in the art to modify the reference or combine reference teachings to establish *prima facie* obviousness (MPEP 2143).

Roberts, et al. alone, or in combination with *Contolini, et al.* or *Nishibe, et al.*, does not teach, show, or suggest a method of planarizing a metal conductive layer on a top surface of a substrate, comprising placing the substrate on a rotable substrate support, rotating the substrate support, contacting the top surface of the substrate with a liquid etching composition while the substrate support is rotating to form an etched metal conductive layer, and exposing the etched metal conductive layer to an etchant gas, as recited in claim 1. Applicant respectfully requests withdrawal of the rejection of claim 1 and of claims 2-8 and 38-39 which depend thereon.

Roberts, et al. alone, or in combination with *Contolini, et al.* or *Nishibe, et al.*, does not teach, show, or suggest a method of forming a metal conductive feature on a substrate, comprising placing a substrate on a substrate support, the substrate having a top surface with a material layer on said top surface, and the material layer having at least one opening therethrough, depositing a metal conductive layer having a pre-etch field thickness, wherein the metal conductive layer completely fills the at least one opening, rotating the substrate, while the substrate is rotating, contacting the top surface of the substrate with a liquid etching composition in order to remove portions of a top surface of the metal conductive layer, and exposing the metal conductive layer to an etchant gas, as recited in claim 19. Applicant respectfully requests withdrawal of the rejection of claim 19, and of claims 20-29, which depend thereon.

Roberts, et al. alone, or in combination with *Contolini, et al.* or *Nishibe, et al.*, does not teach, show, or suggest a method of forming a copper feature on a substrate, comprising placing a substrate on a substrate support, the substrate having a top

surface with a material layer on said top surface, and the material layer having at least one opening therethrough, depositing a copper layer having a pre-etch field thickness, wherein the metal conductive layer completely fills the at least one opening, rotating the substrate, while the substrate is rotating, contacting the top surface of the substrate with a liquid etching composition selected from the group consisting of nitric acid, hydrochloric acid, peroxygen compounds, and combinations thereof, and sprayed onto the substrate in the direction of rotation of the substrate, in order to remove portions of a top surface of the copper layer, placing the substrate in a plasma etch chamber, and exposing the etched metal conductive layer to an etchant gas, as recited in claim 42. Applicant respectfully requests withdrawal of the rejection of claim 42.

Roberts, et al. alone, or in combination with *Contolini, et al.* or *Nishibe, et al.*, does not teach, show, or suggest a method of forming a copper feature on a substrate, comprising placing a substrate on a substrate support, the substrate having a top surface with a material layer on said top surface, and the material layer having at least one opening therethrough, depositing a copper layer having a pre-etch field thickness, wherein the metal conductive layer completely fills the at least one opening, rotating the substrate, and while the substrate is rotating, contacting the top surface of the substrate with a liquid etching composition is selected from the group consisting of nitric acid, hydrochloric acid, peroxygen compounds, and combinations thereof, and is sprayed onto the substrate in the direction of rotation of the substrate in order to remove portions of a top surface of the metal conductive layer, and exposing the etched metal conductive layer to an etchant gas for a period of time sufficient to remove substantially all of the conductive layer from the field of the substrate, and to planarize the top surface of the metal conductive layer, as recited in claim 43. Applicant respectfully requests withdrawal of the rejection of claim 43.

Roberts, et al. alone, or in combination with *Contolini, et al.* or *Nishibe, et al.*, does not teach, show, or suggest a method of forming a copper feature on a substrate, comprising placing a substrate on a substrate support, the substrate having a top surface with a material layer on said top surface, and the material layer having at least one opening therethrough, depositing a copper layer having a pre-etch field thickness, wherein the metal conductive layer completely fills the at least one opening, rotating the

substrate, while the substrate is rotating, contacting the top surface of the substrate with a liquid etching composition selected from the group consisting of nitric acid, hydrochloric acid, peroxygen compounds, and combinations thereof, and sprayed onto the substrate in the direction of rotation of the substrate, in order to remove portions of a top surface of the copper layer, each of steps (a)-(d) being performed in the same electroplating platform and in the same environment, placing the substrate in a plasma etch chamber, and exposing the etched metal conductive layer to an etchant gas, as recited in claim 45. Applicant respectfully requests withdrawal of the rejection of claim 45.

Roberts, et al. alone, or in combination with *Contolini, et al.* or *Nishibe, et al.*, does not teach, show, or suggest a method of forming a copper feature on a substrate, comprising placing a substrate on a substrate support, the substrate having a top surface with a material layer on said top surface, and the material layer having at least one opening therethrough, depositing a copper layer having a pre-etch field thickness, wherein the metal conductive layer completely fills the at least one opening, rotating the substrate, and while the substrate is rotating, contacting the top surface of the substrate with a liquid etching composition is selected from the group consisting of nitric acid, hydrochloric acid, peroxygen compounds, and combinations thereof, and is sprayed onto the substrate in the direction of rotation of the substrate in order to remove portions of a top surface of the metal conductive layer, and exposing the etched metal conductive layer to an etchant gas for a period of time sufficient to remove substantially all of the conductive layer from the field of the substrate, and to planarize the top surface of the metal conductive layer, each of steps (a)-(d) being performed in the same electroplating platform and in the same environment, as recited in claim 46. Applicant respectfully requests withdrawal of the rejection of claim 46.

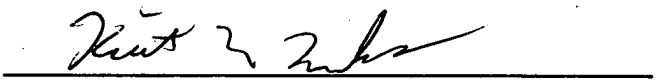
Claims 9 and 30 are rejected under 35 U.S.C. § 103(a) as being unpatentable over *Roberts, et al.*, in view of *Contolini, et al*, or *Nishibe, et al.* as applied to claims 1, 2, 19, and 38, further in view of *Yamamoto, et al.* (U.S. Patent Publication 2002/0037684) or *Lo* (U.S. Patent No. 5,667,630). As discussed above, *Roberts, et al.,* in view of *Contolini, et al,* or *Nishibi, et al.* does not provide a planarization method in which both a liquid etching process and an etchant gas process are used. *Yamamoto, et al.* and *Lo*

describe dry etch methods but do not describe a planarization method in which both a liquid etching process and an etchant gas process are used. Thus, *Roberts, et al.*, in view of *Contolini, et al*, or *Nishibi, et al.* and further in view of *Yamamoto, et al.* or *Lo* does not provide all of the limitations of claim 1 and claim 19, upon which claims 9 and 30 respectively depend. Applicant respectfully requests withdrawal of the rejection of claims 9 and 30.

In conclusion, the references cited by the Examiner, alone or in combination, do not teach, show, or suggest the invention as claimed.

Having addressed all issues set out in the Final Office Action, Applicant respectfully submits that the claims are in condition for allowance and respectfully request that the claims be allowed.

Respectfully submitted,



Keith M. Tackett
Registration No. 32,008
MOSER, PATTERSON & SHERIDAN, L.L.P.
3040 Post Oak Blvd. Suite 1500
Houston, TX 77056
Telephone: (713) 623-4844
Facsimile: (713) 623-4846
Attorney for Applicant(s)